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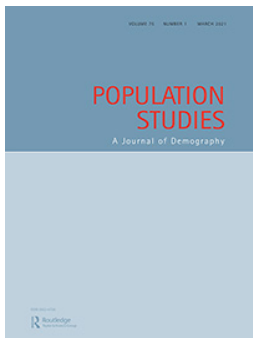
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# Trust and fertility in uncertain times

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*Recent studies have shown higher uncertainty to be associated with fertility decline. This study considers the role of social trust as a coping mechanism when general uncertainty increases. We analyse the fertility data of Italian provinces from 2004 to 2013, thereby incorporating the period of economic recession, which unexpectedly and exogenously increased uncertainty across the population. We find a robust and significantly positive impact of social trust on fertility, which is stronger among younger age groups. Moreover, we find that the buffer effect of trust decreases with the level of public childcare provision, suggesting that low trust endowments may be counterbalanced through public policy.*

Supplementary material is available for this article at: <https://doi.org/10.1080/00324728.2020.1742927>.

**Keywords:** fertility; uncertainty; economic recession; social trust; Italy

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## Introduction

There are now numerous studies analysing the link between uncertainty and fertility, a literature spurred on by recent global events, including the economic recession which began in the second half of 2007 and the associated fertility decline (Sobotka et al. 2011; Kreyenfeld et al. 2012; Vignoli et al. 2012; Goldstein et al. 2013; Myrskylä et al. 2013; Kim et al. 2015; Kreyenfeld 2015; Graham et al. 2016; Matysiak et al. 2016; Comolli 2017). Though not always stated explicitly, the underlying argument of these studies is straightforward: since childbearing involves an irreversible investment with long-run consequences for resources and well-being, greater uncertainty about future prospects will entice couples to postpone and possibly forego childbearing altogether. The way couples perceive and cope with increasing uncertainty depends on their own attitude to risk and their support network. Individuals and couples who are more averse to taking risks are more likely to postpone such irreversible investments (Ranjan 1999; Schmidt 2008), and, at times of heightened uncertainty, risk-averse individuals will postpone more than risk lovers.

In terms of coping mechanisms, the extended family is often touted as an important resource from which individuals can draw support if needed,

though its role vis-à-vis fertility trends is ambiguous (Livi-Bacci 2001). In contrast, social trust, a key ingredient in the broader concept of social capital, has received less attention in demography, despite representing an important coping mechanism when faced with uncertainty (Yamagishi and Yamagishi 1994; Yamagishi et al. 1998; Hofmann and Hohmeyer 2013). Moreover, social trust is associated with a range of favourable outcomes (Fukuyama 1995; Cook 2001; Alesina and La Ferrara 2002; Bjørnskov 2007; Aghion et al. 2008, 2010; Algan and Cahuc 2010), including lower corruption (Uslaner 2002), lower crime and delinquency (Buonanno et al. 2009), lower income inequality (Uslaner 2002), better functioning of financial institutions (Guiso et al. 2004), and spurring of economic growth (Helliwell and Putnam 1995; Knack and Keefer 1997; Zak and Knack 2001). Social trust is also positively correlated with the quality of institutions and political participation. The key argument is that social trust enhances civic engagement and social cohesion of the community where people reside (Knack 2002; Uslaner 2002) and, as such, brings about positive characteristics, such as greater feelings of security, which matter for couples' childbearing decision-making. Given that individuals' perception of uncertainty matters for fertility, and social trust is important as a means to cope with uncertainty, an

obvious extension is to consider whether social trust matters for fertility in times of increasing uncertainty.

Our study considers a period of sudden change in uncertainty. It considers a decade that incorporates the financial crisis of 2008, which for many countries extended into a more general economic crisis. Its onset was unexpected for most households, and other than bringing about economic hardship for many, it also brought about an exogenous change in uncertainty. We focus on Italian provinces during the years 2004 to 2013, thereby incorporating the periods before and after the financial crisis. Our empirical analysis uses a Difference-in-Differences approach, where treatment is defined for provinces with high vs. low levels of trust and where we compare fertility levels in the years before and after the economic recession.

Our results show that fertility declined significantly less during the crisis in the provinces endowed with higher social trust. The effect is stronger for younger than for older individuals, meaning that social trust is a more pertinent mechanism to cope with uncertainty among younger people. These results are robust to an extensive set of sensitivity and robustness tests, among them, the incorporation of explicit controls for systematic differences between provinces in both risk attitudes and family ties. Moreover, we show that public policy—measured in terms of childcare provision—reduces the role of trust in maintaining fertility. That is, for those provinces where childcare provision is adequate, trust matters less in alleviating the potential negative effect of uncertainty on fertility.

The paper provides two important contributions. First, we demonstrate how reproductive behaviour is affected differently by uncertainty in face of different levels of social trust. High social trust, we argue, levels out the negative impact of heightened uncertainty and, as such, maintains fertility at a higher level than where trust is low. In other words, we show that social trust has a positive direct effect on fertility by smoothing unexpected increases in uncertainty. Second, we show that the fertility decline following an uncertainty shock is reduced through childcare provision. There is consequently a certain degree of substitution between policy and social trust, in the sense that the stronger negative effects of the recession in low trust communities are less pervasive if there is a strong childcare infrastructure.

The remainder of the paper is structured as follows. The ‘Background’ section provides a review of the literature and develops the arguments leading to our main hypothesis that social trust moderates a negative impact of uncertainty on fertility,

and a second hypothesis that public policy can reduce the role of trust in maintaining fertility in periods of uncertainty. The ‘Data’ and ‘Method’ sections describe the data and the identification strategy. We then present the main results and several robustness tests, followed by analyses of the complementary role of public childcare services, before concluding.

## Background

The concept of social trust can be viewed both in terms of individual behaviour, as exemplified in the social sciences in trust games, and as a societal characteristic, where trust is high if the individuals of a certain society engage in trusting behaviour and the act of trust tends to be reciprocated (which would mean that individuals are trustworthy). Social trust is consequently viewed as a key ingredient of the more general concept of social capital. A wealth of studies from across the social sciences demonstrate the potentially favourable consequences of trust. Does trust also matter for reproductive behaviour? Simple cross-sectional correlations of fertility and average trust across countries would suggest that it does (Aassve et al. 2016). Indeed, countries where average trust is high, such as those in Scandinavia, also report higher fertility. In countries where trust is low, such as those in Southern and Eastern Europe, fertility is lower. Anglo-Saxon countries score relatively high in terms of trust, and their fertility levels are also rather high (Aassve et al. 2016).

Still, exactly why and how trust should matter for fertility is less explored. Here, we argue that social trust matters for fertility when there is uncertainty. A high level of social trust means that couples have a broader and a more extensive network to rely on in the communities where they live (Yamagishi and Yamagishi 1994; Yamagishi et al. 1998) and, as such, it acts as a coping mechanism when couples are faced with a more uncertain future.

There is a burgeoning literature showing that perceived uncertainty, frequently measured in terms of insecure employment prospects, matters for fertility (Goldstein et al. 2013; Graham et al. 2016; Comolli 2017), though the effect may differ by gender. Higher perceived uncertainty among men tends to lower fertility, whereas for women the effect is ambiguous. In dual-earner societies, where the economic well-being of the household depends on both partners’ incomes, the effect of perceived uncertainty for women might be the same as for men. However,

in societies leaning more to the traditional male breadwinner model, job uncertainty may crowd out women more than men, and potentially increase fertility, as women withdraw from the labour market (Raymo and Shibata 2017).

To assess the role of uncertainty on fertility, it is important to keep in mind that children cannot be considered as a simple consumption good, as is common in economic analysis. In most cases, having children involves a great deal of planning that incorporates a range of elements. Its irreversible nature means that children impose substantial long-term costs. Indeed, Ranjan (1999), drawing on the financial option theory by Dixit and Pindyck (1994), has shown that when there is uncertainty about future income, decision makers tend to avoid irreversible and long-term decisions, childbearing being a prime example. Kohler et al. (2002) have argued that economic uncertainty, caused by economic crisis or depression, limited the childbearing of couples in the lowest-low fertility countries. According to these arguments, macro-level economic instability leads to individual-level financial uncertainty, thus delaying union formation and childbearing in early adulthood in favour of prolonged residence in the parental home, in the pursuit of higher education and job stability. These arguments have been elaborated in the work of Mills and Blossfeld (2013), who argued that contemporary globalized societies are intrinsically permeated by economic uncertainty as they are characterized by new phenomena, including delocalization, internationalization, and the deregulation of the labour market. These elements of uncertainty also affect family formation (de la Rica and Iza 2005; Gutiérrez-Domènech 2007; Mills and Blossfeld 2013) and are viewed by many as the primary forces behind low fertility (Morgan et al. 2011; Kreyenfeld et al. 2012; Goldstein et al. 2013; Schneider 2015).

The way through which couples perceive and deal with increasing uncertainty varies according to their own risk attitude and the extent of the support network they can rely on at times of need. In light of this, it is crucial to keep in mind that social trust is a different concept from risk attitude or family ties, though empirically they are often correlated. It has long been recognized that social trust is higher among those willing to take risks (e.g., Fehr 2009) and lower among those with strong family ties (e.g., Ermisch and Gambetta 2010). Risk attitudes and trust are correlated by definition, since trusting unknown others necessarily entails a certain degree of risk-taking (Buccioli et al. 2019). It is a misconception, however, to consider trust as a specific case of

risk-taking. While risk attitudes are defined according to individual preferences on the riskiness generated by factors unrelated to interpersonal interactions, trust is predominantly concerned with interpersonal interactions, thus also including a component of social preferences. In fact, the act of trusting unknown others and the attitude to risk are generated by distinct neural and cognitive mechanisms (Kosfeld et al. 2005; Cesarini et al. 2008), which are transmitted between and within generations through different channels (Dohmen et al. 2012; Ahern et al. 2014). As with risk attitudes and trust, it is also misleading to view family ties and social trust as the same concepts but with opposite signs. Family ties refer to the extent to which individuals rely on their family members for support. Strong family ties would imply high trust among 'in-group' members. Social trust, instead, refers to the extent to which individuals are willing to put their trust in 'out-of-group' members (unknown others) and, as such, characterizes communities where families live. Consequently, family ties and social trust can both be strong, just as they can both be weak, though it may also be that strong family ties bring about lower social trust.

With respect to fertility, social trust matters as a coping mechanism in that individuals living in high trust communities may perceive the uncertainty accompanying the economic crisis as being less severe than in low trust communities. Despite the future being objectively more uncertain for all, those in communities with high social trust will believe that they can cope better because they have a broader network of individuals to rely on. This argument rests on the idea that trust reflects favourable circumstances where the couple reside. These societies are perceived as safer, because people can trust their fellow citizens despite not knowing them personally and, as such, these very same communities are considered favourable grounds for raising children in the years to come. Consequently, an increase in perceived uncertainty about future prospects is likely to lead to postponement of childbearing, but less so for those couples living in communities where social trust is strong.

An additional argument for why trust matters for childbearing relates to external childcare facilities. It has been argued that high trust individuals are more willing to outsource childcare (de Ruijter and Van der Lippe 2009; El-Attar 2013). In so far as patterns of social capital are persistent over time, high levels of trust may have spurred on the expansion of public childcare, as women are increasingly attending higher education (Aassve et al. 2016). Whereas

easy access to childcare lowers the opportunity cost of childcare in general (Ermisch et al. 2009), it is also possible that the prospect of childbearing during periods of heightened uncertainty may feel less daunting when couples can rely on readily available childcare. Empirically, this would mean that the effect of trust is weakened in regions where public childcare is more extensive.

Several studies suggest that trust varies by age (Sutter and Kocher 2007). For instance, Fehr et al. and Bellemare and Kroeger (2007) have argued that trusting behaviour peaks between the ages of 30 and 40, while decreasing thereafter. As for fertility, age matters in additional ways. In so far as an increase in perceived uncertainty leads couples to postpone childbearing, the effect might be stronger among younger individuals. One aspect is biological, as younger individuals simply have a longer time available to realize their fertility plans. But younger individuals are also often in a more precarious situation regarding jobs and careers. Since most economic recessions disproportionately affect younger individuals, and many find themselves at the beginning of their working careers not yet having achieved job security, their perception of uncertainty may have stronger consequences in terms of childbearing decision-making. For older age groups, the effect might be weaker not only because they are getting closer to the biological limit for childbearing, but also because they have more resources and therefore feel the impact of increased uncertainty as less pervasive.

Italy serves as an intriguing case study for assessing the impact of trust on fertility during the crisis, as there are also strong geographical variations in trust (Putnam 1993). In the North of Italy, we find regions in which trust is as high as in the Scandinavian countries and, as such, we effectively see the North–South European gradient of trust in a single country. Indeed, a lot has been written about trust in Italian society and for good reason. Despite Italian regions having shared the same state institutions, the same language, and the same religion since unification in 1861, there has been a persistent difference across the regions in a range of domains (Bigoni et al. 2016) and, if anything, the gap between the North and the South widened in the years after the Second World War. These remarkable differences have given rise to a wealth of studies. The traditional explanations favoured structural differences. Putnam (1993) instead argued that the differences between the good institutions of northern Italian cities and the poor institutions of the South date back to the Middle Ages. Following up on

Putnam's hypothesis, Guiso et al. (2008) found that experience of living in former free and independent city states explains at least half of the North–South difference in social capital. In other words, the variation in trust across Italy appears remarkably stable over time, and may explain differences in economic prosperity, corruption, and quality of institutions. Recent experimental studies give further support to these ideas. Bigoni et al. (2016) found systematic differences between the North and the South in terms of ability to cooperate after controlling for geography, institutions, and crime. In a further study they also found that the gap in cooperation stems from individuals' beliefs (Bigoni et al. 2017). Italians in the South are pessimistic in their beliefs about their own ability to cooperate with others and they also have a stronger aversion to social risk, both factors consistent with the idea that family ties among them are stronger. These insights are crucial, because in the face of an economic shock, the negative effects may be felt more strongly among those communities where trust is low.

Much has also been written about Italian fertility and its peculiarities when compared with other Western countries. After the baby boom of the 1960s, all Western countries experienced a phase of baby bust during the 1980s, with general postponement and a drop in fertility. In the early 1990s, Italy and Spain were the first countries to attain and sustain lowest-low fertility, defined as a total fertility rate (TFR) at or below 1.3 (Kohler et al. 2002, 2006). Other European countries never reached such low levels, and by the late 1990s, France, the United Kingdom, and all the Scandinavian countries had nearly recuperated their previous fertility levels and were coming close to regaining the threshold of two children per woman. Importantly, when considering cohort fertility for these countries, the number of children ever born to women during their reproductive life remained virtually unchanged. However, Italy, much like Spain and Greece, did not recuperate in terms of fertility. Since the 1990s, Italian fertility has increased somewhat, peaking in 2008 at 1.45 children per woman. After 2008, the first year that fertility would be affected by the Great Recession, the Italian TFR declined again, and by 2015 was back at 1.35 children per woman, along with the highest mean age at first child in Europe (almost 32 years). Importantly for our study, the trend has not been homogenous across Italian areas. Traditionally, fertility was higher in the South of Italy. In more recent times, fertility levels across the Italian regions have converged. But since 2008, the roles have changed and TFRs in the North of Italy have been relatively higher (above 1.4) than



in the South (below 1.3). Geographical differences, with different migration rates and economic conditions, might be behind this new trend, as might differences in attitudes toward traditional Catholic union formation. In less than two decades, births outside marriage have tripled, reaching one in three births in the North; in the South just one in five births takes place outside marriage.

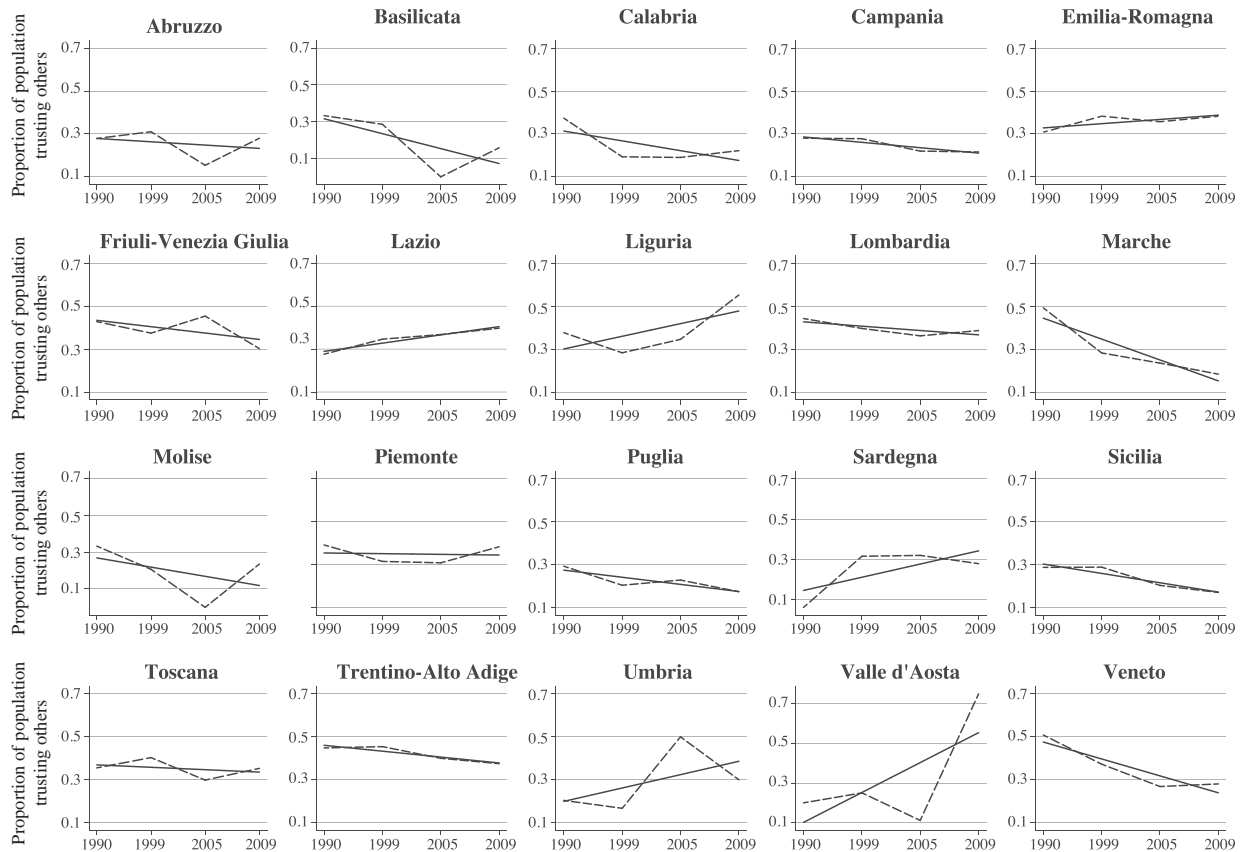
## Data

The analysis is based on a panel data set of 103 Italian provinces, covering the years from 2004 to 2013. For each province we collected information on total fertility. The dependent variable is the period TFR, which measures the number of children that would be born to each woman if she were to pass through her child-bearing years in alignment with the age-specific fertility rates (ASFRs) for each year. These data are collected by the Italian National Institute of Statistics (Istat).

The key explanatory variable is generalized social trust. To construct such a variable, we rely on the measure provided by Nannicini (2013), which is calculated from the 1990 European Values Study (EVS). The EVS asks the question ‘Generally speaking, would you say that most people can be trusted or that you can’t be too careful in dealing with people?’ Trust in each province is computed as the percentage of people that answered ‘Most people can be trusted’, in lieu of the alternatives ‘You can’t be too careful’ and ‘Don’t know’. This is a standard survey measure of trust and different versions of it are used in many other surveys, such as the General Social Survey and the European Social Survey (ESS). Consequently, this measure is used in a large number of studies, including those listed in the previous section. A survey question of this kind cannot be directly compared with experimental trust games. In the latter, trust is measured by the amount player A passes on to an unknown player B, whereas trustworthiness is measured by the amount player B hands back to player A. There are only a few studies that include survey measures of trust as well as the trust game, and there is mixed evidence as to the extent these two measures correlate. Ermisch et al. (2009) found weak correlations in the British Household Panel Survey (where the survey question is asked) using a small subsample engaged in playing a trust game; in contrast, (Murtin et al. 2018), who ran nationally representative samples where several versions of the trust game were included together with the survey question, found that only trustworthiness in the trust game correlated with the survey question on social trust.

To the best of our knowledge, trust measured at the provincial level in Italy is only available from Nannicini (2013). Information about respondents’ province of residence was originally released by the EVS in 1990, but later retracted, and is currently unavailable. As pointed out by Guiso et al. (2004), a potential concern with using province-level data from the EVS is that the Italian EVS sample of 1990 was not stratified by its provinces. Aware of these concerns, we address these issues by running an extensive set of sensitivity tests in order to check how our results vary when several other possible proxies for generalized trust and social capital proposed by the literature (i.e., Guiso et al. 2004; Cartocci 2007; Nannicini et al. 2013) are taken into account. Crucially, these alternative measures are not derived from surveys but instead from population data, and should consequently be free from any bias that could be present in the EVS sample. In addition, we also rerun the main analysis at the NUTS II level (i.e. for 20 Italian regions) to verify its consistency with respect to a more official source of the information contained in the EVS about generalized trust (compared with the data set retained by Nannicini).

The reason for using a measure of generalized trust referring to 1990 is twofold. First, as just noted, this is the only available measure of generalized trust at the Italian provincial level. Second, using a measure referring to an earlier period (well before the onset of the economic recession and increase in uncertainty) reduces possible concerns about endogeneity and reverse causality. However, a possible drawback of this choice might be that the level of trust could have genuinely changed since 1990, thus possibly generating a measurement error in the estimates. Unfortunately, we cannot test this hypothesis directly at the Italian provincial level, given the availability of this measure for 1990 only. Nonetheless, we consider the stability of trust at the regional level, for which the information is indeed available from both the EVS and ESS. In particular, Figures 1 and 2 show the percentage of people trusting others in the 20 Italian NUTS II regions in specific years, using information contained in both the EVS and the ESS. We use both surveys for this exercise to reduce the possible noise and under-representation at NUTS II level of each single survey, and also because they provide a picture for different years within two different time windows. Indeed, while information in the EVS refers mainly to the pre-crisis period, the ESS also takes into account the post-crisis period. By looking at the linear interpolation in each graph (solid straight lines),



**Figure 1** Time trends in generalized trust for Italian regions according to the European Values Survey

*Notes:* The graph shows the time trends (dashed lines) in the proportion of people trusting others in each Italian region. Note that the years with available data are not evenly spaced. The proportion is calculated using all the waves available for Italy within the EVS. Solid straight lines represent the linear fit for each region.

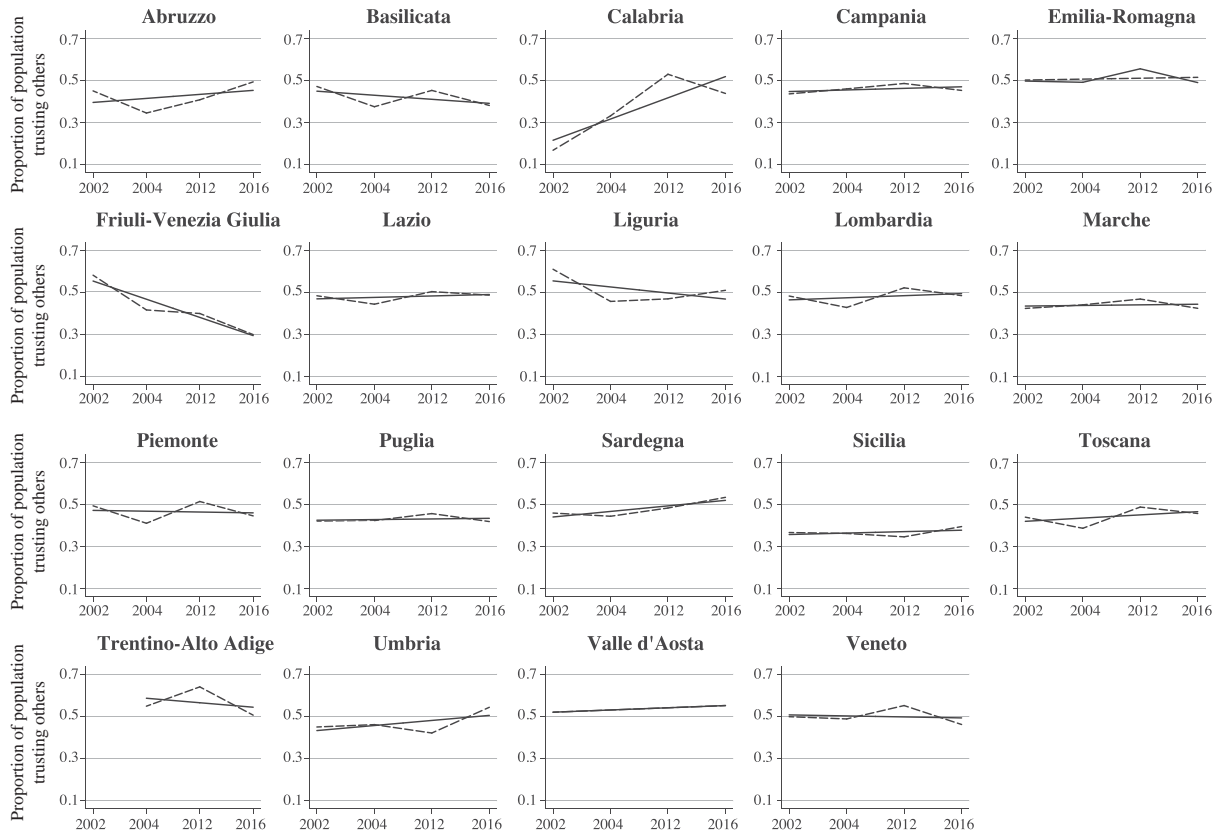
*Source:* EVS 1990, 1999, 2005, and 2009.

we can see they are almost flat for most of the Italian regions, regardless of the survey. This suggests that the level of generalized trust captured by the survey question is pretty stable over time, thus reassuring us about the validity of the survey measure referring to 1990. A further corroboration of this conclusion is provided by the analysis at regional level discussed in Appendix A2 (in the supplementary material), in which instead of calculating the level of trust using only the 1990 wave of EVS, we took the average value for each region across all the waves available for Italy before the financial crisis: that is, for 1990, 1999, and 2005. Admittedly, there are some regions in which trust does seem to change within the time interval. Such changes do not invalidate our conclusion about the general stability of trust both before and after the crisis. They are both negative and positive in almost the same proportion and only observed for the smallest regions in terms of percentages of the total Italian population. These aspects, taken together, suggest that the deviations

are generated by noise due to an under-representation of these regions, as opposed to an actual change over time in the percentage of people trusting others within each region.

In order to make interpretation easier, we run our regressions on a dichotomous version of the trust variable. In other words, we distinguish provinces with high and low trust levels according to whether they lie in the top quartile of the trust distribution. Provinces are assigned a value equal to '1' (high trust) if they belong to the highest quartile of the trust distribution (i.e. more than 38 per cent of population trusting others), and '0' (low trust) otherwise. Later we test the robustness of the main results with respect to the use of the continuous measure of trust (see Appendix A2). Figure 3 shows the density distributions of the TFR (panel (a)) and our measure of social trust (panel (b)). As can be seen, the TFR distribution approximates the normal distribution very well. Also, the distribution of trust is similar to the normal distribution, even if it is slightly more left skewed. Figure 4 shows the distribution across Italian provinces of





**Figure 2** Time trends in generalized trust for Italian regions according to the European Social Survey

*Notes:* The graph shows the time trends (dashed lines) in the proportion of people trusting others in each Italian region. Note that the years with available data are not evenly spaced. The proportion is calculated using all the waves available for Italy within the ESS. Solid straight lines represent the linear fit for each region. Data for Molise are missing, as are as those for Trentino-Alto Adige for 2002 and Valle d'Aosta for 2004 and 2012.

*Source:* ESS 2002, 2004, 2012, and 2016.

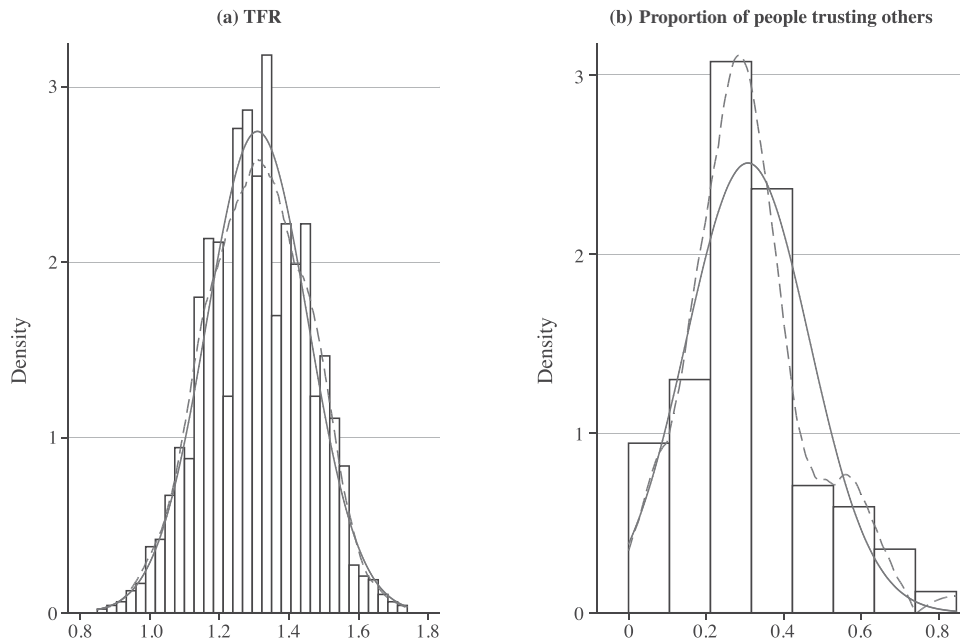
both the average TFR in the post-crisis period and generalized social trust. Analysis of the maps shows that provinces with a higher average TFR after the crisis and also those with a higher level of generalized social trust are mostly concentrated in the northern part of the country. In general, the geographical distributions of the two variables appear very similar, providing descriptive evidence in favour of our hypothesis on the positive role of trust in smoothing the effect of the crisis on fertility.

Social trust correlates with a range of factors. As our interest lies in identifying whether trust by itself can predict fertility trends, we control for those elements that could relate both to trust and to fertility. It is important to emphasize, however, that our measure of trust is taken from 1990, which is well before the observational window of 2004–13. This naturally reduces the endogeneity concerns, especially the possibility of reversed causality.

The first group of control variables concerns the economic characteristics of the Italian provinces. The general economic situation within a province

can, of course, have an impact on both the opportunity cost of children and on trust levels. To control for heterogeneity in the structure of the economy, we use data on employment levels within each macro sector (i.e. primary, secondary, or tertiary), as retrieved from Istat. Additionally, to take into account the condition of the local labour market, we include the unemployment rate among men and women aged 15–34 years, also produced by Istat. We check, too, for women's participation in politics. We might expect that with higher political participation among women, more attention would be paid towards policies that are beneficial towards childbearing (Catalano 2009, 2016). To proxy women's political participation, we use the average percentage of councillors who are female across municipalities within a province, which we have collected from Italian Ministry of Internal Affairs. As with the other control variables, the information is provided for each of the years covered in our panel.

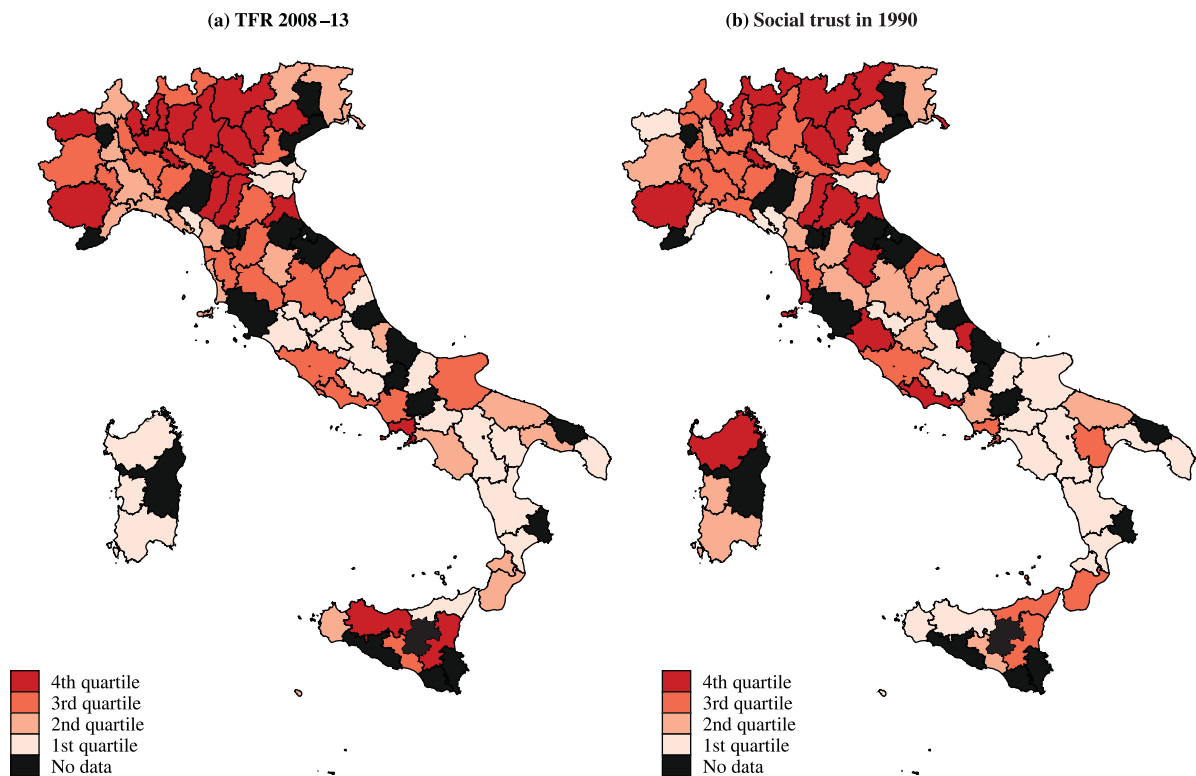
We next control for human capital, which may affect both fertility (Becker et al. 1990; Impicciatore



**Figure 3** Density distributions of the TFR and generalized social trust across Italian provinces

*Notes:* The graph shows in panel (a) the density distribution of the average TFR in the period 2008–13 and in panel (b) the density distribution of generalized social trust in 1990. The continuous curve represents the hypothetical normal density distribution, while the dashed curve shows the actual k-density distribution.

*Source:* EVS 1990, Nannicini (2013), and Istat.



**Figure 4** Geographical distribution of TFR and generalized social trust across Italian provinces

*Notes:* The map shows in panel (a) the quartile of the distribution of the average TFR at the provincial level during the period 2008–13 while in panel (b) the quartile of the distribution of trust at the provincial level in 1990. The more intense the shading colour of a province, the higher the quartile it belongs to. Provinces where data about generalized social trust are unavailable are coloured black in the maps.

*Source:* As for Figure 3.

and Dalla Zuanna 2017) and trust (Alesina and La Ferrara 2002; Jones 2008). Since there are no available data on education across provinces for a sufficient number of years, we create instead a proxy for education using newspaper circulation for each province. Specifically, we use the total number of newspapers sold (per 1,000 inhabitants) at year-province level. The data are collected by the Italian National Press Agency (Accertamenti Diffusione Stampa).

To account for differences in the resources available for public spending by local government, we again use information provided by the Italian Ministry of Internal Affairs, from which we create a dummy variable equal to '1' for provinces showing political alignment between the incumbent governments at provincial, regional, and national levels (Bracco et al. 2013), and '0' otherwise. Lastly, in some of the robustness tests we also control for changes in risk aversion at different points in time and for strength of family ties. To construct the first variable, we rely on the question about risk aversion provided in the 2004 Survey on Household Income and Wealth (SHIW) by the Bank of Italy. For the measure of strength of family ties, we rely on the work of Alesina and Giuliano (2010) and use the information provided in the EVS of 1990 and 1999.

A key variable for our analysis is the availability of childcare services, such as public nursery schools. These services provide support for parents by enabling them to outsource childcare, thus potentially encouraging parents to have more children (Aassve et al. 2016). However, the availability of well-functioning public services might be a result of high trust (Bjornskov and Tinggaard Svendsen 2009; de Ruijter and Van der Lippe 2009; El-Attar 2013). In our analysis we use information provided by Istat to create a variable that measures the percentage of municipalities providing childcare services within a province.

A complete list and description of all variables employed in the main analysis, and those used in the sensitivity and robustness tests, is provided in Appendix A1 (in the supplementary material), together with their original sources. Table 1 displays summary statistics for the final sample. It includes only 80 provinces, since we lack information about trust for 21 provinces and on the presence of missing values among the control variables for two provinces.

## Method

The financial crisis of 2008 negatively affected the Italian economy and the resources available both

for industries and households, thus increasing the general level of economic uncertainty across the country. The shock induced by the crisis was not anticipated by Italians, since it started in the United States and only then spread to the rest of the world. This implies that the shock can be reasonably assumed to have been exogenous with respect to both the distribution of trust across Italian provinces and specific socio-economic confounders affecting the relationship between trust and the TFR.

To provide a sense of the impact of the crisis on the Italian economic environment and the uncertainty experienced by Italian households, we plot in Figure 5 the average trend for high and low trust provinces in: (a) gross domestic product (GDP) per capita in purchasing power parity using 2010 as the base year; and (b) the unemployment rate. Looking at the pre-crisis period, we can see that GDP per capita increased up to 2007 when its upward trend stopped, supporting the idea that the shock was exogenous. Such an interpretation is further reinforced by looking at the unemployment rate, which instead systematically decreased during the same period. Both trends reversed from 2008 onward with a shrinking in GDP per capita and a dramatic increase in the unemployment rate. Importantly for our identification, the trends are homogeneous across the two types of province, suggesting that the change in households' economic and labour conditions induced by the crisis was similar between provinces with high and low levels of generalized social trust. In Appendix A2 of the supplementary material we present a formal test for this.

The setting lends itself to a Difference-in-Differences (DiD) approach, where provinces with high generalized trust are assigned to the treatment group, while provinces with a lower level of trust are placed in the control group. We compare the TFR between these two groups, both before and after 2008. Figure 6 informs us about the validity of the parallel trends assumption (a formal test of this assumption is provided in the next section). In pre-crisis times, the TFR trend for provinces with a high level of trust mimicked the trend for low trust provinces fairly well. The general effect of the crisis is detectable in the TFRs of both groups of provinces, starting from 2008. Since the crisis actually began in the second half of 2007, any potential effect on individuals' childbearing outcomes can only be detected from 2008 onwards, given the natural lag of nine months between the start of a pregnancy and the birth of the child. For this reason we consider 2008 as the first year

**Table 1** Summary statistics of dependent and explanatory variables for Italian provinces 2004–13

	Mean	Standard deviation	Minimum	Maximum
Total Fertility Rate (TFR)	1.36	0.13	0.93	1.74
Trust	0.31	0.16	0.00	0.85
Risk aversion	3.38	0.33	1.95	4.00
Strength of family ties	0.41	0.49	0.00	1.00
Distribution of childcare services (proportion)	0.52	0.29	0.02	1.00
Unemployment: males aged 15–34 (proportion)	0.17	0.10	0.01	0.47
Unemployment: females aged 15–34 (proportion)	0.22	0.12	0.02	0.56
Employment: secondary sector (proportion)	0.30	0.09	0.13	0.53
Employment: tertiary sector (proportion)	0.66	0.08	0.46	0.85
Percentage of female councillors	0.19	0.06	0.05	0.36
Political alignment	0.41	0.49	0.00	1.00
Newspaper circulation (per 1,000 inhabitants)	101	46	27	446

*Note:* Summary statistics are calculated for a sample of 800 observations, that is, for 80 Italian provinces observed yearly during the period 2004–13. Further information on variables can be found in the ‘Data’ section and in the supplementary material (Appendix A1). We lack information about trust for 21 other provinces (Agrigento, Benevento, Biella, Brindisi, Chieti, Crotone, Forlì-Cesena, Grosseto, Imperia, Isernia, Nuoro, Parma, Pesaro and Urbino, Pistoia, Pordenone, Prato, Ragusa, Rimini, Siracusa, Teramo, and Venice) and the presence of missing values among the control variables for two other provinces (Enna and Bolzano).

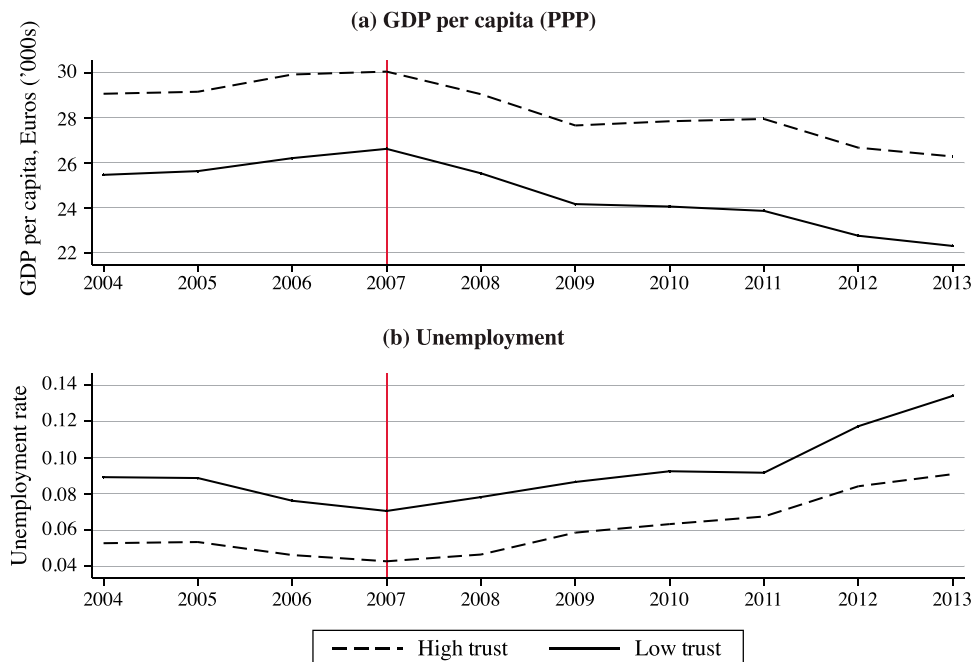
*Source:* See Appendix A1 in the supplementary material.

of the post-crisis period. The average TFR among provinces belonging to the control (low trust) group stopped increasing abruptly in 2008, while for provinces with high levels of trust it continued to rise up to 2010, but at a slower rate. Here we see the possible role played by trust in smoothing the increase of economic uncertainty induced by the crisis. After 2010, the TFRs of both types of provinces started to decline.

The DiD framework is summarized by the following equation:

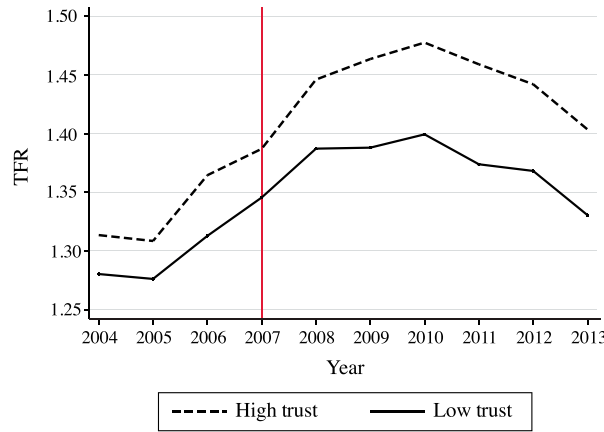
$$\text{TFR}_{i,t} = \beta_0 + \beta_1 \text{Trust}_i \times \text{Crisis}_t + \mathbf{X}'_{i,t} \boldsymbol{\beta} + \alpha_i + \gamma_t + \epsilon_{i,t} \quad (1)$$

where  $i$  defines the province and  $t$  the year. The aim is to consistently estimate the coefficient  $\beta_1$ , which represents the effect of the interaction between our

**Figure 5** The impact of the 2008 financial crisis on the Italian economy and labour market, 2004–13

*Notes:* Panel (a) shows the yearly trend in GDP per capita in purchasing power parity with 2010 as the base year, while panel (b) shows the trend in the unemployment rate. The vertical line indicates the beginning of the financial turmoil in 2007.

*Source:* Istat.



**Figure 6** Trends in TFR 2004–13 for two groups of Italian provinces by level of trust

Notes: The comparison is between provinces within the lowest three quartiles of the trust distribution (Low trust, solid line) and those belonging to the highest quartile (High trust, dashed line).

Source: As for Figure 5.

treatment  $\text{Trust}_i$  (being a province in the highest quartile of trust distribution) and  $\text{Crisis}_t$  (an indicator variable for the post-crisis period). The coefficient identifies the different trend in the TFR in provinces characterized by different trust levels once the crisis hit. Equation (1) contains province fixed effects ( $\alpha_i$ ) to take into account time-invariant heterogeneity at the provincial level, and also year fixed effects ( $\gamma_t$ ) to consider common shocks across provinces. The matrix  $\mathbf{X}_{i,t}$  contains time-varying confounders at the provincial level that might affect the TFR and the level of trust as described previously. We include all the variables introduced in the ‘Data’ section, together with the dummy variable  $\text{Crisis}_t$ . In the specifications with year fixed effects, we do not include the indicator variable  $\text{Crisis}_t$ , since it is strongly correlated with the year dummies. Finally, standard errors are adjusted for heteroskedasticity and clustered at the provincial level to account for serial correlation.

### The effect of trust on fertility in uncertain times

The estimates from Equation (1) are reported in Table 2. The model in column (1) includes province fixed effects. Column (2) includes province fixed effects and also the full set of controls previously described in the ‘Data’ section, while column (3) augments the model in column (2) by also adding year fixed effects. Column (3) is referred to as the complete model. Results support the initial thesis that the TFRs of provinces with high trust levels are affected less by the onset of the crisis. Specifically,

the effect of trust corresponds to a lesser decline in TFR during the crisis, ranging from 3.1 to 3.4 percentage points, with the complete model showing a value of 3.1 percentage points.

To obtain further insights about the timing of the effect, we run a slightly different specification of the DiD model, including leads and lags. By analysing leads we run a formal test for the validity of the parallel trends assumption in the pre-crisis period, whereas lags allow for an assessment of the duration of the effect, and give a sense of the extent to which the effect changes over time (Autor 2003). The model with leads and lags is as follows:

$$\text{TFR}_{i,t} = \beta_0 + \sum_{j=2004}^{2013} \beta_{1,j} \text{Trust}_i \times \text{Year}_t + \mathbf{X}'_{i,t} \boldsymbol{\beta} + \alpha_i + \gamma_t + \epsilon_{i,t} \quad (2)$$

where the coefficients  $\beta_{1,j}$  represent the interaction between the presence of a high level of trust in province  $i$  and the indicator variables for each year  $t$ . Table 3 presents the estimates both for the model without controls except for year and province fixed effects, and for the complete model, while Figure 7 gives a graphical representation of the latter. Provinces with high and low levels of trust were performing similarly before 2008, with all the coefficients small in size and not statistically significant. The interaction term  $\text{Trust}_i \times \text{Year}_t$  becomes significant from 2008 onwards and peaks in 2011.

We run separate estimations for the ASFRs consistent with an equation like (1). The estimates are made for the age groups 17–24, 25–29, 30–34, 35–39, and 40–50 years. These additional regressions provide further insights into the heterogeneous

**Table 2** Difference-in-Differences estimates for the TFR in Italian provinces 2004–13: baseline results

	(1)	(2)	(3)
Trust × Crisis	0.0344*** (0.0118)	0.0306** (0.0122)	0.0312** (0.0120)
Controls	NO	YES	YES
Year fixed effects	NO	NO	YES
Province fixed effects	YES	YES	YES
No. observations	800	800	800
No. provinces	80	80	80
R <sup>2</sup>	0.387	0.426	0.565

\* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$  (two-tailed tests).

Notes: The dependent variable is the Total Fertility Rate. The variable *Trust × Crisis* is the interaction of the treatment (a dummy taking the value of '1' for a province in the highest quartile of distribution of generalized social trust) with *Crisis* (a dummy taking the value '1' for the years 2008–13). The set of controls includes the percentage of municipalities with childcare services, average percentage of municipal councillors who are female, percentage employed in the secondary sector, percentage employed in the tertiary sector, unemployment rate for males aged 15–34, unemployment rate for females aged 15–34, newspaper circulation (per 1,000 inhabitants), and a dummy for political alignment between central and local administrations. Standard errors are clustered at the provincial level.

Source: Authors' analysis based on the data described in Appendix A1 (in the supplementary material).

effects of trust on fertility as uncertainty increased due to the economic downturn. In addition, the regressions act as a placebo test for the empirical method. That is, if the detected effect indeed

depends on the role of trust (by alleviating the impact of the crisis on fertility in terms of economic uncertainty) we should observe the coefficient of social trust decreasing with age and becoming

**Table 3** Difference-in-Differences estimates for the TFR in Italian provinces 2004–13, with the inclusion of leads and lags

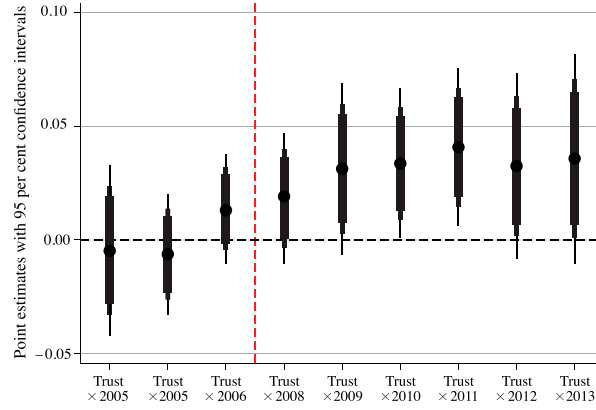
	(1)	(2)
Trust × 2004	−0.0083 (0.0144)	−0.0045 (0.0142)
Trust × 2005	−0.0092 (0.0108)	−0.0063 (0.0101)
Trust × 2006	0.0102 (0.0084)	0.0138 (0.0091)
Trust × 2008	0.0173* (0.0099)	0.0183* (0.0108)
Trust × 2009	0.0340** (0.0136)	0.0313** (0.0143)
Trust × 2010	0.0367*** (0.0113)	0.0336*** (0.0124)
Trust × 2011	0.0437*** (0.0121)	0.0408*** (0.0131)
Trust × 2012	0.0323** (0.0142)	0.0325** (0.0154)
Trust × 2013	0.0315** (0.0152)	0.0357* (0.0175)
Controls	NO	YES
Year fixed effects	YES	YES
Province fixed effects	YES	YES
No. observations	800	800
No. provinces	80	80
R <sup>2</sup>	0.547	0.568

\* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$  (two-tailed tests).

Notes: The dependent variable is the Total Fertility Rate. The variable *Trust × Crisis* is the interaction of the treatment (a dummy taking the value of '1' for a province in the highest quartile of distribution of generalized social trust) with indicator variables for each year 2004 to 2013. The omitted category is the interaction between *Trust* and the dummy for the year 2007 (the year before the outbreak of the crisis). Column (2) includes controls for the percentage of municipalities with childcare services, average percentage of municipal councillors who are female, percentage employed in the secondary sector, percentage employed in the tertiary sector, unemployment rate for both males and females aged 15–34, newspaper circulation (per 1,000 inhabitants), and a dummy for political alignment between central and local administrations. Standard errors are clustered at the provincial level.

Source: As for Table 2.





**Figure 7** Difference-in-Differences estimates with leads and lags

*Notes:* The figure shows the point estimates of the model in Table 3 and the confidence intervals at 90 per cent (least wide spikes), 95 per cent (medium width spikes), and 99 per cent (widest spikes). The omitted category is the interaction between Trust and the dummy for the year 2007.

*Source:* Authors' analysis based on the data described in Appendix A1 (in the supplementary material).

insignificant for the oldest age group. After all, those in the oldest age group are both more likely to have a permanent job and to be at the end of their natural reproductive period, thus would be less affected by the increasing uncertainty induced by the crisis. This means that we would expect any decision on their part to have a child to be less dependent on trust, thus showing an insignificant coefficient for the oldest age group. The results are given in Table 4 and confirm this hypothesis. After the ASFR peaks for the 25–29 age group, the coefficients decline, and for the oldest age groups (35–39 and 40–50-year-olds) the effect is no longer significant. In other words, the effect of trust in stabilizing fertility after the economic crisis declines with age. Interestingly, we do not find any significant effect for the youngest individuals (aged 17–24). Many of these were still in education during the crisis, which made them less sensitive to a sudden increase in uncertainty in terms of fertility, simply because they would not yet have considered childbearing as part of their choice set.

In the next section we discuss how the effect detected in the baseline varies according to the level of public childcare provision, while in Appendix A2 of the supplementary material we provide an extensive set of further checks in order to validate our identification strategy, as well as to test the robustness of the baseline estimates.

### Social trust, childcare policy, and fertility

So far, we have found robust evidence that a sudden hike in uncertainty depressed fertility more in low

trust areas than in those with a higher level of trust. We have suggested that this effect occurred through a stronger perception of the uncertainty connected to childbearing decision-making, which in turn increased due to the negative economic shock. That is, in a low trust setting, individuals' perceptions of increasing uncertainty following the economic crisis are stronger if they consider the support they can receive from their community to be lower. As we have argued, this relationship is potentially modified once we take into account public policies explicitly aimed at easing child-rearing. One example of such a policy is the availability of public childcare services, which is likely to affect individuals' opportunity costs of having a child by reducing the uncertainty associated with reconciling work and family life. Our hypothesis is that if the direct impact of trust on fertility acts to smooth the increased uncertainty due to the crisis, then its effect should be weaker when individuals are provided with more extensive public childcare services. To test this hypothesis, we implement a triple Difference-in-Differences estimator based on the following specification:

$$\begin{aligned} \text{TFR}_{i,t} = & \beta_0 + \beta_1 \text{Trust}_i \times \text{Crisis}_t + \beta_2 \text{DCS}_{i,2003} \\ & \times \text{Crisis}_t + \beta_3 \text{Trust}_i \times \text{DCS}_{i,2003} \\ & \times \text{Crisis}_t + \mathbf{X}'_{i,t} \boldsymbol{\beta} + \alpha_i + \gamma_t + \epsilon_{i,t} \end{aligned} \quad (3)$$

where the distribution of childcare services (DCS), here measured by the percentage of municipalities providing childcare services within each province in 2003, is interacted with both  $\text{Crisis}_t$  and  $\text{Trust}_i \times \text{Crisis}_t$ . The results are presented in Table 5, in which column (1) reports the estimates of the model with just province fixed effects, and

**Table 4** Difference-in-Differences estimates for ASFRs in Italian provinces 2004–13

Age group	(1) 17–24	(2) 25–29	(3) 30–34	(4) 35–39	(5) 40–50
Trust × Crisis	0.0042 (0.0036)	0.0134** (0.0055)	0.0085*** (0.0030)	0.0038 (0.0026)	0.0015 (0.0012)
Controls	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES
Province fixed effects	YES	YES	YES	YES	YES
No. observations	800	800	800	800	800
No. provinces	80	80	80	80	80
R <sup>2</sup>	0.282	0.174	0.348	0.794	0.789

\* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$  (two-tailed tests).

Notes: The dependent variables are age-specific fertility rates for ages 17–24 in column (1), 25–29 in column (2), 30–34 in column (3), 35–39 in column (4), and 40–50 in column (5). The variable Trust × Crisis is the interaction of the treatment (a dummy taking the value of ‘1’ for a province in the highest quartile of distribution of generalized social trust) with Crisis (a dummy taking the value ‘1’ for the years 2008–13). The set of controls includes the percentage of municipalities with childcare services, average percentage of municipal councillors who are female, percentage employed in the secondary sector, percentage employed in the tertiary sector, unemployment rate for both males and females aged 15–34, newspaper circulation (per 1,000 inhabitants), and a dummy for political alignment between central and local administrations. Standard errors are clustered at the provincial level.

Source: As for Table 2.

column (2) gives those of the model adding time-varying controls, while column (3) shows the complete specification including year fixed effects. The coefficients presented in the complete model strongly support our hypothesis that trust and the provision of public services are substitutes. The interaction between Trust<sub>*i*</sub> and Crisis<sub>*t*</sub> remains positive, confirming that for provinces without any provision of public childcare services, trust has a strong effect on the TFR.

The coefficient of the interaction between Crisis<sub>*t*</sub> and DCS<sub>*t,2003*</sub> is also significantly positive and substantial, meaning that in provinces with low trust levels the availability of this type of public service counters the negative effect of the crisis on fertility. On the contrary, the triple interaction is negative, sizable, and statistically significant, clearly indicating a substitutability between trust and the availability of public childcare services in reducing the negative impact of the crisis on the TFR. In other words, in

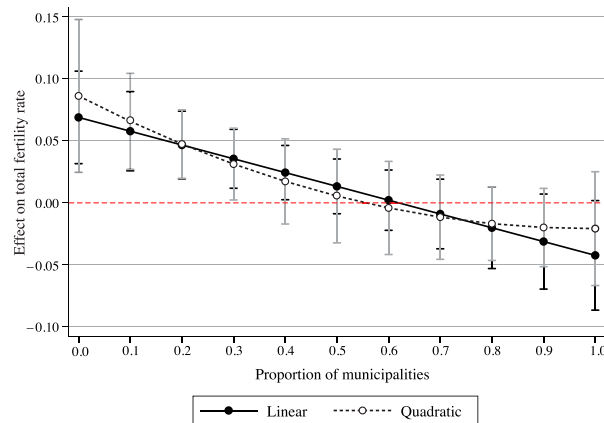
**Table 5** Triple Difference-in-Differences estimates for the TFR in Italian provinces 2004–13: the effect of trust for different levels of childcare services

	(1)	(2)	(3)
Trust × Crisis	0.102*** (0.0244)	0.700*** (0.0181)	0.0689*** (0.0190)
Crisis × DCS <sub>2003</sub>	0.245*** (0.0364)	0.130*** (0.0248)	0.132*** (0.02350)
Trust × Crisis × DCS <sub>2003</sub>	−0.156*** (0.0463)	−0.113*** (0.0355)	−0.111*** (0.0351)
Controls	NO	YES	YES
Year fixed effects	NO	NO	YES
Province fixed effects	YES	YES	YES
No. observations	800	800	800
No. provinces	80	80	80
R <sup>2</sup>	0.475	0.460	0.600

\* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$  (two-tailed tests).

Notes: The dependent variable is the Total Fertility Rate. The variable Trust × Crisis is the interaction of the treatment, (a dummy taking the value of ‘1’ for a province in the highest quartile of distribution of generalized social trust) with Crisis (a dummy taking the value ‘1’ for the years 2008–13). The variable DCS<sub>2003</sub> × Crisis is the interaction of DCS<sub>2003</sub> (a variable that measures the percentage of municipalities with active childcare services within a province in 2003) with Crisis. The variable Trust × Crisis × DCS<sub>2003</sub> is the interaction of the three variables listed above. The set of controls includes the percentage of municipalities with childcare services, average percentage of municipal councillors who are female, percentage employed in the secondary sector, percentage employed in the tertiary sector, unemployment rate for both males and females aged 15–34, newspaper circulation (per 1,000 inhabitants), and a dummy for political alignment between central and local administrations. Standard errors are clustered at the provincial level.

Source: As for Table 2.



**Figure 8** Average marginal effects of trust in post-crisis times

*Notes:* The figure shows the average linear and quadratic marginal effects on the TFR of being a high trust province by different levels of public childcare provision, together with the 95 per cent confidence intervals. Public childcare provision is measured as the proportion of municipalities providing childcare services within each province.

*Source:* As for Figure 7.

provinces where the uncertainty of reconciling working and family life is lower, given more easily accessible public childcare services, the role of generalized social trust in smoothing the uncertainty induced by the crisis is reduced, compared with provinces without public childcare services. This last result is summarized in Figure 8, which shows both the linear and quadratic average marginal effects of generalized social trust in the post-crisis period according to different levels of childcare provision. The graph suggests that the role of trust in stabilizing the negative impact of the crisis strongly decreases as the level of childcare provided by public institutions in each province increases, and also shows the absence of any non-linearity in such a relationship.

## Conclusions

In this paper, we have provided further evidence that social trust matters for reproductive behaviour. The role of trust has been extensively studied in the social sciences, but much less is known about its potential for explaining fertility trends. Here, we have presented robust evidence that during an economic downturn, lower trust brings about lower fertility. We have argued that the underlying mechanism occurs through individuals' and couples' perceptions of uncertainty. When the sense of uncertainty is heightened, couples tend to postpone commitments that may have long-term consequences for their family life. Our analysis also shows that the negative effect of the economic downturn in low trust areas is buffered by the availability of childcare services. This makes sense

because the opportunity cost of childbearing will be lower when parents with young children can rely on publicly provided childcare to a greater extent. The economic downturn may affect their job opportunities and their consumption habits, but, all else being equal, the cost of child-rearing will be lower when there are childcare facilities in place. This is encouraging news, in the sense that it suggests that negative effects can be counterbalanced through appropriate policy interventions, not least through an expansion of public childcare.

We should also reflect on the fact that the differential effects of the economic crisis for low trust provinces vs. high trust provinces appear to be long-lasting. Whereas the effect was particularly noticeable between 2007 and 2008, and again between 2008 and 2009, the estimates of the leads and lags (shown in Table 3) indicate no trace of any narrowing of the gap between high and low trust provinces. Additional structural features explain this persistency. In 2011, Italy was exposed to the sovereign debt crisis, which led to the collapse of the elected government of the time. This was followed by a pension reform, and then a significant labour market reform introduced in 2014. Whereas these reforms cannot be considered exogenous, they might have sustained the sense of uncertainty, therefore maintaining the long-term differences between low and high trust areas in terms of their fertility trends. All of this suggests that fertility in low trust areas is unlikely to rebound any time soon.

Our study also begs the question of whether social trust has mattered for the broader fertility differentials observed across Western societies in recent decades. Kohler et al. (2002) argued that fertility

decline came about from a new wave of economic uncertainty associated with new technology and a rapidly shifting labour market. Similarly, Mills and Blossfeld (2013) argued that globalization brings about stronger uncertainty through delocalization, internationalization, and the deregulation of the labour market. As such, our analysis suggests that in fertility terms, there are winners and losers in the new regime of uncertainty, but that trust appears to have played an important role.

## Notes

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